UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/559,145	05/05/2006	Darren Hogg	PH0337	9067

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EXAMINER
MALEVIC, DJURA

ART UNIT	PAPER NUMBER
2884	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/559,145	HOGG ET AL.
	Examiner	Art Unit	
	DJURA MALEVIC	2884	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>28 May 2008</u>.

2a) ☒ This action is **FINAL**.   2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-23</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1-23</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on <u>05 December 2005</u> is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☒ All   b) ☐ Some *   c) ☐ None of:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____.

        3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

The amendment filed 05/28/2008 was entered.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

Claims 1, 2, 5 - 13 and 16 – 23 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Shao et al. (US Patent 6,008,493) in view of Badawi et al.

(Algorithms for calculating detector efficiency normalization coefficients for true

coincidences in 3D PET, Phys. Med. Biol. 43 (1998) 189 - 205).

With regards to claims 1, 2, 12, 13 and 23, Shao discloses a method of

generating detector efficiency data for a positron emission tomography scanner

including: a detector array (Col. 5, Line 18) for generating detection data; and a single

photon source (Col. 5, Line 58), wherein the method comprises the steps of: conducting

an acquisition procedure using the single photon source to produce detection data (Col.

5, Line 58); and processing said detection data. Shao fails to expressly disclose an

efficiency estimation algorithm to calculate data representative of the efficiencies of

individual detectors in said array. Badawi teaches algorithms for calculating detector

efficiency during blank scans (Introduction). Thus, it would have been obvious to a

person of ordinary skill in the art at the time the invention was made to modify Shao to

include the teachings of Badawi in order to obtain a full set of normalization coefficients

for statistical accuracy. Note, it is further obvious that computer software controls said

algorithms.

With regards to claims 5 and 16, Shao discloses the claimed invention according

to claims 1 and 16, absent some degree of criticality, the recitation of the scanner is a

non-rotating scanner is considered an obvious matter of design choice involving only

routine skill in the art. For example, one skilled in the art would include a non-rotating

scanner if the application were to be implemented in an Exact3D Pet apparatus.

With regards to claims 6 and 17, Shao discloses the scanner is a rotating

scanner (Col. 6, Line 11).

With regards to claims 7 and 18, Shao discloses the scanner comprises two

single photon sources 30A & 31A (Col. 7, Line 15) and the method further comprises

the step of selectively operating one of the two single photon sources during the

conducting step (Col. 7, Line 64).

With regards to claims 8 and 19, Badawi discloses obtaining estimates for all

efficiencies for all detectors (2.3 Algorithms for calculation of intrinsic efficiencies), thus

the step of and generating an output (inherent to said method), responsive to said data

representative of efficiencies, on an output device for an operator (specifically, middle of

page 192).

With regards to claims 9 and 20, Badawi discloses processing said data

representative of efficiencies to identify detector elements, or groups of detector

elements having relatively low efficiencies. Although, Badawi fails to expressly say "low

efficiencies", it is obvious that Badawis' disclosure of crystal efficiencies would also

include corrections of said low efficiencies since variations in the efficiencies may be

invalid (See Badawi, 2.3 Algorithms for calculation of intrinsic efficiencies, Page 192).

With regards to claims 10 and 21, Badawi discloses processing said data

representative of efficiencies using a function determining a parameter relating to an

average over a plurality of detector elements (2.2 Implementation of the geometric

corrections [4], Page 191 - 192).

With regards to claims 11 and 22, Badawi discloses processing said data

representative of efficiencies using a function determining a parameter relating to an

amount of variation therein (2.1Normalization model, Page 190 - 191).

Claim 3, 4, 14 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Shao and Badawi in view of Gregan et al. (US Patent 6,198,104).

With regards to claims 3 and 14, Shao modified discloses the claimed invention

according to claims 1 and 12, but fails to expressly disclose producing artificial

coincidence count data during an acquisition and wherein the step of processing said

detection data comprises processing said artificial coincidence count data. Gregan

teaches the artificial coincidences and processing said artificial coincidence as claimed

(Abstract, Col. 7, Lines 17 – 50). Thus, it would have been obvious to a person of

ordinary skilled in the art to modify Shao to include the teachings of Gregan in order to

correct the PET images.

With regards to claims 4 and 15, Shao modified discloses the claimed invention

according to claims 3 and 14, but fails to expressly disclose that measured counts of

artificially coincident pairs is related to a weighted sum of there individual efficiencies. However, weighting said coincident pairs is well known and conventional used in the art. Thus, it would have been obvious to a person of ordinary skill in the art to relate the said coincident pairs to a weighed sum of individual efficiencies since the weighted sum would increase the accuracy of the correction.

Response to Arguments

Applicant's arguments filed 05/28/2008 have been fully considered but they are not persuasive.

In response to applicant's argument that Badawi is related to using a positron emission source, rather than using a single photon source as claimed in the present invention, thus using the wrong model for a single photon source, the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

In this instance, Badawi calculates intrinsic detector efficiency by use of an algorithm and one of ordinary skill in the art would have recognized that efficiency algorithms would be useful in Shao, i.e., normalization processes. One skilled in the art can appreciate that algorithms are well known and conventionally used in the art and modifying Shao is considered routine design choice involving only ordinary skill. Therefore, Shao teaches all elements of independent claim 1, except for the efficient

algorithm. Badawi teaches an efficiency algorithm. Accordingly, the combined

teachings of the references would have suggested the recited claim, as explained

above for normalization, to those of ordinary skill in the art, thus the rejection is proper.

The examiner directs attention to a previous prior art, which was recited in the

conclusion of the previous office action (Vickers, US Patent 5,677,536). Vickers teaches

that it is known to automatically normalize detectors for drift, gain and noise. Therefore,

Vickers teaches that it is known in the art to normalize for intrinsic effects. The examiner

has cited additional art in the conclusion below which may be pertinent to applicant's

disclosure.

Conclusion

The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure.

Hines et al. (US Patent 6,100,531) shows a dual-purpose transmission source for

use in a nuclear medicine imaging system is described. A Cs-137 point source is used

to transmit radiation having a 662 keV photopeak to a corresponding detector during a

transmission scan of an object. The Cs-137 source can be used in transmission scans

for correcting either coincidence or single-photon emission data for non-uniform

attenuation. When performing a transmission scan to correct single-photon emission

data, a collimator may remain mounted to the detector, since a substantial portion of the

transmitted radiation completely penetrates the radiation-absorbing material of the

collimator to reach the detector.

Bailey et al. (Strategies for accurate attenuation correction with single photon transmission measurements in 3D Pet; IEEE 1998; pp 1009-1013) show a PET system benefiting from using <u>a single photon source for correcting attenuation data</u>, similar to independent claim 1.

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Djura Malevic whose telephone number is 571.272.5975. The examiner can normally be reached on Monday - Friday between 8:30am and 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Porta can be reached on (571) 272-2444. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent

Application Information Retrieval (PAIR) system. Status information for published

applications may be obtained from either Private PAIR or Public PAIR. Status

information for unpublished applications is available through Private PAIR only. For

more information about the PAIR system, see http://pair-direct.uspto.gov. Should you

have questions on access to the Private PAIR system, contact the Electronic Business

Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO

Customer Service Representative or access to the automated information system, call

800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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